tion. The illustrations themselves are of much interest; plans and portraits of several of the magnificent ships of the Line, views of many places and scenes from Gravesend to New Zealand, star-charts which may furnish a nightly education in astronomy as well as navigation, and maps of all the countries along the route.

When we say the work is edited by the Rev. W. J. Loftie, it will be evident that it is of an unusually high stamp. The special feature of the text is that besides the information about the Line and its ships, instructions to passengers and such like useful hints, we have special articles on seamanship, navigation, natural history at sea, and weather at sea. All the leading features along both the Suez route and the Cape route are pointed out and information given about them as the voyage proceeds, while special chapters are devoted to all the Australian colonies, to Egypt, the Holy Land, Italy, European cities, and the mother country. Thus it will be seen that the "Orient Guide" is adapted for the use of voyagers from both ends of the route.

As a means of conveying some practical knowledge of science, and arousing an interest in the subject, the chapters on seamanship, navigation, meteorology, and natural history must be particularly useful. Under "Seamanship" we are informed about all the most important points in the structure and working of a vessel. Such common terms as "running," "reaching," "beating," are explained, as are also the causes of the various motions of a ship—rolling, pitching, scudding, and so on; the various rigs of ships, the different species of ropes and knots, the various phrases shouted in working the helm, and other terms in nautical phraseology. The chapter on navigation ought to be particularly welcome to landsmen; by means of it the mere progress of the vessel itself, the daily operations of the officers in connection therewith, the conduct of the compass, the reading of charts, the use of the sextant, the various methods of ascertaining longitude, the use of the log, and so on—all can be made to furnish the passenger with constant sources of interest, and give him some idea of the many and complicated scientific principles which underlie so apparently simple a matter as the navigation of a steam vessel. The chapter also contains much information about the stars and their utility to navigation. The star-charts which accompany the chapter are not overloaded with names, and will be found of real utility in detecting the leading stars and watching their nightly changes as the vessel proceeds on her course.

The chapter on natural history contains succinct information on the leading forms of animal life likely to be met with during the voyage—land, coast, and ocean birds, fish of various kinds, cetaceans, the nautilus, zoophytes; while the marvellous phenomenon of the luminosity of the sea is explained. By a study of the chapter on the weather at sea, passengers may be able to throw more intelligence and variety into that monotonous and never-ending topic of conversation.

The more purely geographical part of the work is done in considerable detail. All the features met with on both routes are described in the order of their occurrence. Then for the benefit of those going out there are several chapters on the various Australian colonies, on their various aspects, scientific, geographical, and economical. On the other hand, for the benefit of Australians there is a general chapter on European travel, and special chapters on Egypt, Sinai, and the Holy Land, Italy, European cities, and the mother country—all richly illustrated.

Thus it will be seen that the "Orient Guide" is something very different from the ordinary run of guide-books, and that with it as a constant companion on board ship, a voyage to or from Australia may be made a real education. We should like to see other companies follow the example so well set by that of the Orient Line; travelling by sea has now become so common that thus the serious defects of English education in geography might be largely remedied. But even the railway companies might follow the example. Several years ago we noticed a geological guide to some of the United States railways, in which the various formations along the routes were described in the order of their occurrence as the train proceeded. Something of a similar kind might very well be done for English railways, extending the programme, however, to other features besides those relating to geology. Meantime the Orient Line is to be congratulated on its enterprise, and on the intelligence which has guided the compilation of their handsome work. Mr. Loftie has not only edited the work, but written the chapter on Egypt, while other special subjects have been treated by Dr. Charles Creighton, Mr. G. Baden Powell, Commander Hull, and Mr. H. E. Watts.

THE LATE MONSIEUR WURTZ

WE have received the following communication from a Paris correspondent:—

The *éloges* pronounced over M. Wurtz's grave and your estimate of his place in science, doubtless being prepared, will tell your readers the extent of his life-work as a chemist. Indeed the best monument that could be raised to his memory would be a list of the work that has come from the laboratory at the École de Médecine during his thirty-four years' direction. But your readers may perhaps also be interested to know something of M. Wurtz as he appeared to those who were his pupils at the time of his death.

The impression one had at the beginning of M. Wurtz's first lecture was one of utter surprise. Organic chemistry was no longer a dry science full of dry formulæ, tiresome, complicated and difficult to remember; for the whole series of chemical transformations appeared as some philosophical romance in which the atoms and groups of atoms had their own particular characters, and could in given circumstances be depended on to act in a particular way. Yet, notwithstanding the picturesqueness of expression, there was no sacrifice of scientific accuracy. His teaching was so skilfully designed that each of his phrases could be interpreted immediately by the theories of thermo-chemistry and dissociation, which the more advanced student would learn later to apply to the study of organic chemistry, and by whose help the science is being gradually brought more and more to a purely physical stage. In the same way the psychology of the individual characters in life may some day be capable of being interpreted by purely physiological results. But notwithstanding the assertions of some eminent chemists, and notably of Wurtz's great rival Berthelot, no more in chemistry than in psychology is the problem thus reduced to one of rational mechanics. It seems, on the contrary, that for the accomplishment of this end account must inevitably be taken of those atoms for which Wurtz fought so hard, and of which Berthelot and the École Normale still deny the probable existence.

Taken aback at first by the new way of presenting well-known facts, one was soon carried along by the stream of Wurtz's eloquence and by his enthusiasm; and as one came out of the theatre, though Wurtz never left his subject to go into transcendental digressions, one had a feeling of being raised from the common things of life- a feeling of being better in every way for the new revelation of scientific truth.

Wurtz's eloquence was exceeded only by his modesty. He spoke of and praised Hofmann's general method for the preparation of the compound ammonias without mentioning the fact that it was he who discovered and recognised the first compound of this type. He eulogised Berthelot's great discovery that glycerine is a triatomic

alcohol, then spoke of the diatomic alcohols or glycols; but no one in the audience could have guessed that it was he who first gave an accurate interpretation to Berthelot's results, and that he followed up and confirmed his generalisation by the brilliant discovery of the glycols.

I cite but two cases out of many, for during the whole of his course Wurtz never alluded to one of his discoveries as being his own; and certainly from his own lectures his large audiences at the Sorbonne could have had no idea of the leading part he played in the grand development of modern organic chemistry.

Having already exercised his immense influence at the École de Médecine, he felt himself at too great a distance from his auditors at the Sorbonne, and while he was having a laboratory (still unfinished) built for him, he inaugurated last year a series of weekly *conférences*[1] under his own direction, which might well find their analogues in the English Universities. Each week M. Wurtz gave out two subjects (such as molecular weights, the paraffins, the ethers, &c.), and two students volunteered to give lectures (lasting from half an hour to three-quarters of an hour) on them the week following. The *conférences* were delivered in one of the large lecture-rooms to audiences of from sixty to eighty students; Wurtz himself sat at the end of the lecture-table and gave a kindly and helpful criticism after the *conférence* was over. The last of these *conférences* was given just three weeks ago by the writer of these lines, and M. Wurtz's kind words will always be a precious memory to him:—they were the last he was destined to utter in public.

Wurtz was a fine man, of commanding presence. To alleviate the organic disease from which he suffered, and from which he died, he began by his doctor's orders to work at gymnastics about ten years ago, and he was, notwithstanding his sixty-six years, an accomplished gymnast at the time of his death. The untiring activity of his mind appeared in a certain vivacity and restlessness of manner peculiar to himself; but one felt, as soon as one saw and spoke to him, that he was a straightforward, loyal-hearted gentleman.

M. Wurtz was followed to the grave not only by the official deputations from the Sénat, the Institut, and the various learned institutions with which he was connected, but also by hundreds of students, principally from the École de Médecine and the Faculté des Sciences, bearing, according to French custom, wreaths of flowers, and thus paid their last tribute to the memory of their loved master. One could not help noticing especially an immense wreath of white flowers, offered by the women-students of the Faculté de Médecine, as a testimony of their gratitude to the man who some fifteen years ago obtained permission for them to study in the Faculty, and whom they followed to his last resting place right across Paris from the Boulevard St. Germain to the cemetery of Père la Chaise.

The sympathy which M. Wurtz inspired in all with whom he came in contact, coupled with his great genius, gave him a personal influence beyond that of most men—for if he is dead to us in the body he is still living in the mind, aye, and in the hearts, of the thousands of students who have listened to him in rapt attention on the benches of the École de Médicine and of the Sorbonne. As he said of Dumas: *Forma mentis æterna.*

Paris, May 16

ROBERT ANGUS SMITH

ANOTHER of the men of the middle time has passed away. Early on Monday morning, the 12th inst., whilst Adolphe Wurtz lay dying at Paris, Angus Smith breathed his last at Glynwood, Colwyn Bay. Both men were of the same age, and both were pupils of the illustrious Liebig—students in the great chemical school of Giessen. Each, in a sense, was imbued with some one phase of the spirit of their many-sided master, but in a different manner: Wurtz spent his energies and won his greatest triumphs in the development of chemical theory, and in the elucidation of the structure of organic compounds; Smith had probably little knowledge of, and but little sympathy with, the theories of modern organic chemistry; and although possessed of his countrymen's love of metaphysics, and, as his writings show, capable of much abstract speculation, his conceptions of chemical constitution were probably, in the main, as mechanical as those of Dalton, whose disciple and chief interpreter he considered himself to be. His chief point of contact with Liebig lay in his recognition of the utilitarian side of his science: for upwards of forty years he laboured unceasingly to show how chemistry might minister to the material comfort and physical well-being of men—not in the manufacture of new compounds useful in the arts, or in the establishment of new industries,—but in raising the general standard of the health of communities by checking or counteracting the evils which have followed in the train of that enormous development of the manufacturing arts which is the boast of this century. Sweetness and light were fixed articles in Smith's creed. His love of fresh air, of pure water, of a green hillside was intense. "Where to, sir?" asked a cabdriver whom Smith had hailed on his way home, tired and longing for escape from beneath the dull, murky Manchester sky. "To the sun!" was the answer. And we are told that it was to the credit of that cabman that he did not take the old philosopher to some hostelry with the sign of Phœbus, but trundled him among the green lanes beyond the city's outskirts until it was time to turn the horse's head homewards. To keep the air in our towns fresh and wholesome, to restore the water of our streams to its pristine clearness, to preserve the freshness and verdure of the fields and woods, to sweeten the atmosphere of the crowded dwellings in cities,—this was the kind of work to which Smith dedicated his life, and at which he laboured to the very last. There have been greater chemists, no doubt; his name is not associated with any fundamental discovery in chemistry, and his attempts at theorising were not always very happy; but in his true vocation, as the chemist of sanitary science, Smith worked alone, and we have yet to find the man on whom his mantle has fallen.

Robert Angus Smith was born in the neighbourhood of Glasgow on February 15, 1817. When nine years of age, he was sent to the High School, and at thirteen he entered the University of Glasgow. He quickly showed that liking for the classics, and especially for Greek, which clung to him through life, and his mother, as usual among Scottish matrons, cherished the aspiration that her son should "wag his pow in a poopit." Whether this ambition was ever shared by her son is doubtful; at all events, such a career became impossible for Smith after hearing the preaching of Campbell of Row: he declared that he could not take "holy orders in a kirk which had expelled a man for being apparently both wiser and better than itself." On leaving the University he acted as tutor in various families in the Highlands and in London. What directed him towards science does not appear. In company with his brother John, who is known as the inventor of a chromoscope, and as the author of some speculations on the cause of colour and the nature of light, he had read the standard works of his time on natural philosophy and chemistry. When twenty-two years of age he found himself at Giessen, and after working under Liebig for some time he obtained his doctorate. He returned to England in 1841, and procured employment under Dr., now Sir Lyon, Playfair, in connection with the Health of Towns Commission. It was this circumstance which doubtless served to fix the direction of his future work. His earliest publication—a contribution to the then recently founded Chemical Society of London—was a paper on the air and

[1] I need hardly say all University lectures are quite free in France.